INTERNATIONAL HEALTH EXHIBITION

Supplements to The Builder.

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HANDICRAFT TEACHING, MODELS, APPARATUS, &c., WITH RESULTS OF INDUSTRIAL WORK DONE IN TECHNICAL SCHOOLS.

ONE of the most important sections of the Education Division in the Health Exhibition is that comprised in the new building of the Central Institution of the City and Guilds of London, having relation to educational work and appliances, &c. Although the exhibits to some extent bearing on primary, secondary, and art and science schools have been on view in the Albert Hall, with some more in the Belgian Court, yet the display intended in the City and Guilds of London Institute is not open to the public as we write, though great haste was being made to have everything in position before the close of the present week. In the new building, as well as in the Albert Hall and elsewhere, there is a large collection of apparatus and fittings, with examples of work executed by boys and youths, shown in relation to elementary schools; yet the particular portions that come within our province at present are those exhibits in connexion with technical and apprenticeship schools. *En passant*, we may also state that a special feature in this new building will be the French educational exhibits bearing upon the primary schools of France, and the industrial teaching imparted therein. Some of the British exhibits in connexion with technical and apprenticeship schools are arranged in a room near the top of the building, the walls of the corridor leading thereto being hung with a large number of drawings in relation to building and coach-building construction. The heavier class of exhibits of Group VI. are in the basement story, comprising lathes, workshop-benches, carpenters', cabinetmakers', carvers', and wood-workers' tools generally. Before commencing to describe the principal exhibits on view, we may further remark that none of the stands were numbered on the occasion of our visit, and the goods also of some intending exhibitors were not on view. Assuming, however, that the numbering in the catalogue will be adhered to, we adopt it. Mr. John Channon, Newland-street, Pimlico, S.W. (Stand 1,512), who is instructor in brickwork in Finsbury Technical College, exhibits a brickwork finial of Renaissance design, which may be pronounced excellent in point of execution. The jointing is very fine, and the surface of the bricks as even as possible. This brick finial in style had its counterpart in much of the work executed in the Queen Anne and Early Georgian periods. Two drawings accompany this exhibit, giving full workshop details for its execution, plan of consoles, with illustration showing the bond and true shape of bricks as cut in first instance. The workshop details, or "setting-out," as workmen are wont to designate the development of the lines, are worthy of every commendation, and will certainly afford apprentices or young workmen a clear and good technical lesson in ornamental brickwork. The number of exhibits shown in this top room, as executed by the students of the Technical School, University College, Nottingham, are admirable as a whole, and impart sound and practical teaching in relation to the carpentry, joinery, and other kindred branches they relate to. Here is a model of a queenpost roof for engine-house, so framed that the tie-beam can be utilised for raising heavy weights, by the insertion of ringed bolts, the said tie-beam or girder being well tied up to the framework above. The other exhibits include a model of newel staircase, well constructed, a number of small models or portions of staircase and handrail work, cylinders, and wreaths, constructed on true geometrical principles. The panel and handrail exhibit (in part) the blocked well-hole, showing the method for gluing up the pieces that form the cylinder that makes the circuit of the well-hole, and the small scroll in mahogany, with portion of straight rail; all are well handled. A number of drawings accompany the above exhibits, clearly illustrating handrail construction for various forms of stairs, from the first lesson in the tangent method of describing handrail ramps and wreaths, &c. Mr. L. J. Franks, Hutchinson-street, Aldgate, E.C. (Stand 1,513), displays various articles of fretwork, comprising alphabets, memorials, writing utensils cut from wood, and also designs and tools for making the same. The articles on the stand were partly concealed by a covering during our visit, and we were unable to see but a few of them. That portion which we were able to examine of the fretwork articles appeared to be very well executed. The Sheffield School Board Central Schools (Stand 1,514) display a large number of pieces of carpentry and joinery, models illustrating the principles of construction, &c. These are called "workshop exercises," and excellent exercises they are for youths intended for the building trades, to which they relate. Here we have articles or portions of joinery and framing illustrating mortising, tenoning, scarfing, halving, mitreing, dove-tailing, and other forms of uniting timber in framing. A good plain model of queen-post roof is also shown, evidencing cleanly handled and accurate work. There are accompanying drawings coloured, or in imitation of the grain of the wood, displaying the different forms of joints in carpentry, and also in relation to iron construction. The whole of the exhibits of this school are very creditable, and are calculated to effect much good in the practical instruction of boys in the crafts to which they belong. The Oldham School of Science and Art (J. P. Phythian and J. Robertson, Stand 1,510) display a collection of coloured chalk drawings on black board, in detail of machine construction. There are also models of roofs and good illustrations of descriptive geometry, showing, by a series of stretched strings strained from a level plane to a vertical, the relation between the traces of lines lying in it, intersection of a line and plane normal to a plane, and the horizontal line to a plane. Again, we have, by the medium of these stretched cords or strings (in elevation), two intersecting lines enveloping a sphere and their tangent plane. These illustrations are truly practical lessons in geometry, valuable to young artisans in building construction, for they could understand more in a few minutes from their examination than they would probably in hours of studying drawings on a flat surface in relation to the same problems. The Allan Glen's Institution, Glasgow (Stand 1,515), have on view a very fine and varied assortment of models of machines, and parts of machines, with examples of mechanical drawing and machine design. There is also a drawing, in isometrical projection, of the chemical laboratory in the Institution. This is one of the educational establishments in Scotland visited by the Royal Commission on Technical Education, and favourably reported upon in their report, which is being noticed in these pages. The models and drawings have all been executed by the boys in the Institution. These models and parts of machines in wood are coloured or painted to represent the appearance of the metal. The exhibits are very numerous in connexion with steam machinery, couplings, shaftings, safety-valves, &c., and, as a whole, they reflect great credit on the Institution, for they afford undeniable evidence of the value of the technical teaching and preparatory handicraft instruction imparted to the boys. Mr. James Rigg, 11, Queen-Victoria-street, E.C. (Stand 1,516), occupies a large space, but with advantage to the practical-minded visitor, by exhibits in relation (I.) to practical plane and solid geometry; (II.) machine construction; (III.) building construction (illustrating roof principles, &c.); (VI.) theoretical mechanics; (VII.) applied mechanics; (XXII.) steam, the latter including sectional working models of various machines and steam-engines for class instruction. This is a very valuable display, and well worthy of the visit of the young building artisan and mechanical engineer. A detailed description of even a tithe of the exhibits shown by Mr. Rigg would necessitate more space than we can afford. The exhibits, in regard to materials and workmanship, even apart from the sound constructive lessons their study will afford, merit every commendation. The National Industrial Home for Crippled Boys, Wright's-lane, Kensington (Stand 1,517), presents, among other exhibits, a number of examples in carpentry, joinery, and fancy cabinet work, executed by the boys in the Institute. Apart from the above workmanship there are specimens of heraldic stamping, and copper-plate printing, tailoring, harness-work and saddlery. The finished examples in relation to joinery work, including desks, work-boxes, and kindred articles, are very fairly finished by the poor youths of this deserving institution. The School of Art-Wood Carving, Royal Albert Hall (Miss Rowe, manager, Stand 1,519), has on view a number of specimens of carving, moulding, panels, brackets, &c. The case in which these exhibits were enclosed on the occasion of our visit was partly veiled within by coverings of paper, so we could only see a few of the exhibits, which appeared to be of good design and cleanly handled. This wood-carving school is in connexion with the City and Guilds of London Institute.

In the corridor, stretching from the head of the staircase to the room in which the above exhibits are displayed, there are arranged upon the walls on each side the coach-building and house-building drawings mentioned in the beginning of our notice. The Institute of British Carriage Manufacturers, G. N. Hooper, president, 16A, Great Queen-street (Space 1,506), display firstly drawings to scale of carriages and parts of carriages; secondly, models to illustrate the various joints, bevels, and fastenings in framing carriages. The drawings to scale are well executed. Among the carriage building exhibits are some executed by mere youths, and others by adults engaged in one department or another of the coach and carriage-making trade. Of models proper, or those executed in wood or iron, we did not observe any, save two small pieces of work. In coach and carriage building there are, it may be observed, both carpentry and joinery, as well as iron construction, and technical knowledge in designing and framing is very necessary. There are curves, too, which are amenable to the rules of practical geometry, though the education of the eye and bold freehand drawing can accomplish much. The Coachmakers' Company or Guild display a very fine collection of competition drawings, which gained first, second, and third prizes during the last two years. These drawings are full-size. The competition drawing by Mr. William Coward, age 21, which is a first-prize one, is exceedingly good as a whole, with bold and flowing curves, yet uniting stability in construction. The second-prize drawing by Mr. George Budd is very creditable.

Kindred exhibits in carriage-building are shown by the Institute of Methods and Results, Manchester, and a number of drawings are also displayed upon the walls of the corridor, illustrating the instruction given in carriage-building, &c., in special trade schools, Newcastle-on-Tyne and Worcester. St. Mark's Technical and Drawing Classes for Coach Artisans, Mr. Thomas Coward, secretary, George-street, Grosvenor-square (Space 1,507A), exhibit a large number of drawings illustrative of lessons in practical geometry, solid projection, and coach-making details. Accompanying the above are a series of written questions and answers in coach-building by students of St. Mark's, such as are required in the annual examinations of the City and Guilds of London Institute. The drawings are well calculated to effect the object of practical or technical instruction in the somewhat complex craft of coach-making. Of drawings connected with building construction, we have in the same corridor a number in relation to home and foreign chemical laboratories shown by the Technical College, Finsbury. Then we have Professor Armstrong's Working Tables, Students' Working Tables (Owens College, Manchester, &c.). This large collection of laboratory constructive details consists of those which were used by Mr. E. C. Robins, architect, in illustrating papers read by him recently at the Royal Institute of British Architects. Mr. A. B. N. Kennedy, University College, London, presents plan and photographs of engineering laboratory at that institution, with some results of the work done. The Manchester Museum Committee display upon the corridor walls a collection of pictures for schools, by means of which it is sought to lead children to take interest in objects represented in the pictures in books describing the objects, in the processes by which the pictures were made, and in art. There are two or three exhibitors absent from the corridor, and one particularly whose absence we noticed in connexion with the workshop group of exhibits, although he is duly catalogued in both departments.

Coming to the exhibits on the basement-floor the Britannia Company, Colchester (Stand 1,523), display a large number of lathes, some of them specially adapted for boys in workshop schools. On this stand there are also on view a circular saw for foot or steam, and fret-saws for workshops and for ordinary use. The assortment is varied, and although most of the lathes are of the ordinary description, they are apparently strong in make and moderate in price. Messrs. Melhuish & Sons, Fetter-lane, E.C. (Stand 1,524), exhibit a very large and varied collection of carpenters', joiners', cabinet-makers', and other woodworkers' tools, with amateur's lathe for wood or metal. All kinds of carvers' and engravers' tools are also on view, as well as two very noticeable carpenters' benches, with sliding instead of fixed check, and a screw at the back end as well as one at the usual place in the front. These benches have a drawer, and are of solid beech, the end screws working the sliding-check being of hornbeam wood. The vice at end of sliding-check will prove very serviceable to woodworkers in performing a number of operations where a tight grip is needed. These workshop benches have been manufactured in the Black Forest, Germany, and for strength and immobility they are not exceeded by any bench in the British Market. All their parts are well put together, and they could scarcely be produced in this country at the price for which they are sold. The exhibits of all kinds are of good manufacture. Mr. John Henry Evans, Wardour-street, Soho (Stand 1,525), exhibits four particular lathes, one self-acting slide, and screw-cutting lathe, a lathe with requisite fittings for ornamental turning, and two smaller lathes for youths, or for ordinary technical workshop school purposes. The 5-in. central lathe fitted with oval and eccentric chucks and other adjustments, is a very fine machine for ornamental turning. Beautiful designs can be worked out by certain arrangements, and the exhibitor himself, who is a practical turner, will be seen occasionally at this stand, showing his dexterity in working delicate patterns in ivory and wood. Messrs. Holtzapffel & Co., Charing-cross, S.W. (Stand 1,526), are well known in connexion with the production of lathes of the best kind. One of the family is the author of a book on lathes and the turnery art, which has run through several editions, and a new one is in preparation. Nothing yet produced in the way of lathes exceeds the general good workmanship and finish of the lathes of this firm. The ordinary machines are fully up to the mark, while those intended for ornamental turnery are simply exquisite, if we can apply the term to describe their perfection, or rather, let us say, their excellence in finish in all their details. The work in ivory representing Gothic church architecture, cinquefoil sinkings or cuttings, Perpendicular and geometrical tracery, and other details, is all lathe work. There are also on view ornamental turnery, representing vases, chalices, finials, &c., executed by the instrumentality of the ornamental lathes by the adjustment of certain chucks and slides necessary to be used in the production of higher class and complex ornamental turnery. This firm show a portable forge for ship riveting or for repairing work in connexion with other trades. Mr. Thomas J. Syer, Finsbury-street, E.C. (Stand 1,527) has on view some workshop benches intended for colleges or technical schools where some manual exercises in certain trades form a part of the teaching. There is one long bench fitted for four pupils, but capable of working six at certain operations not requiring such a lengthened space as planing up long pieces of scantling. This bench is supported on metal standards of an ornamental pattern, and fitted with four patent grip irons, which take a hold almost instantaneously. A second and shorter workshop school-bench is also shown, of a very serviceable kind, together with bench knives, holdfasts, mitre machines, and sundry other tools needed by carpenters, joiners, and other woodworkers.

We have now noticed all the appliances, models, plans, &c., we found in position on the occasion of our visit in the class relating to handicraft teaching in technical and apprenticeship schools. As we have said already, there will be found a large number of exhibits also in the building of the Central Institution of the City and Guilds of London in relation to elementary trade teaching in primary schools. If it be deemed necessary, these exhibits may come in for a separate notice, particularly that portion bearing upon primary schools in France. From what we have described in connexion with British exhibits an insight may be had of the effect of the movement in favour of technical education in the British Islands. Manufacturers will, of course, be ready to supply all sorts of appliances, apparatus, and fittings for the possible wants of boys as well as men; still, though class instruction in various ways may prove valuable as a preparatory course, and as means to an end, the regular workshop must constitute the best training school for the turning out of skilled workmen.

BATHS, LAVATORIES, WATER-FITTINGS, &c.

Class XXXI. is mainly devoted to baths, lavatories, and other appliances necessary for personal cleanliness or curative treatment. These exhibits are, for the most part, located in East Central Gallery C, but there are some other exhibits of the kind scattered about in various parts of the Exhibition. These we will refer to further on, but must perforce include in the present notice mention of such water-closets, urinals, traps, &c., as may be necessary in connexion with the stands mentioned; for though the majority of such appliances are exhibited in the South and East Annexes (see our previous notices), the classification is very imperfect. We commence, then, by taking the first stand in East Central Gallery C, viz., No. 927, that of Mr. George Jennings, of Stangate, who exhibits some excellent tip-up and other lavatories, among them a double lavatory fitted with patent shampooing apparatus capable of being used for either basin. This is a very convenient arrangement, and is likely to be much appreciated in clubhouses and other similar establishments. A combined lavatory and urinal, with automatic flushing arrangement, is likely to find much favour in situations where space is limited, and where convenience and sightliness are desiderated. For billiard-rooms and other situations, Jennings's concealed lavatories for angles or other positions may be commended to the notice of visitors interested. A housemaid's sink with flushing rim, butler's pantry and wash-up sinks for kitchens and sculleries, some good plumbing and brass work, besides a useful though not very elegant water-post or drinking-fountain, and Jennings's self-cleansing ball-traps, are among the miscellaneous contents of this stand. The chief exhibits of this firm, however, consist of a very complete bath and lavatory, fitted *en suite* with some excellent cabinet work in mahogany of exquisite marking. This cabinet work has been made by the exhibitors from designs furnished by an architect. The workmanship is excellent, but we cannot speak in unqualified terms as to the excellence of the design, of which the weakest parts are, in our opinion, the "broken" and curled pediments, and more particularly that over the lavatory. Nevertheless this kind of thing is sure to find admirers among the votaries of the so-called "Queen Anne" style. The bath itself is fitted with all recent improvements, including a mixing chamber for the hot and cold water, so that the blend of hot and cold water having been made to the bather's fancy, he has only to turn on one valve each for douche, spray, sitz, or shower. The lavatory is fitted with shampooing apparatus. In the rear of these exhibits, Mr. Jennings shows his new pedestal-vase wash-out closet, with trap inside the pedestal, which stands well clear of the wall at back and sides, and needs no boxing-in in front. There are no valves, cranks, or levers below the seat, which is hinged so as to turn up and allow of the use of the closet as a slop-sink or urinal. By the peculiar square shape of the basin a full depth of water is obtained at the sides. The outgo is at the front. At the back, just below the water-line, is a row of small holes, through which fine jets of water issue each time the flushing arrangement comes into action, there being also a flushing-rim at the top of the basin. The water issuing from these small holes is intended to facilitate the clearing of the contents of the basin by driving them down the outgo, but the provision of these holes is a detail as to the wisdom of which we are not quite persuaded, for it seems to us to be quite within the range of possibility that these fine holes will become clogged up, so that the closet will lose in efficiency if its efficacious flushing be dependent upon their being kept clear. Apart from this detail, however, we think the form of the closet is highly to be commended, and it is one of the best things of its particular kind in the Exhibition. Its external surface may be made as ornamental as fancy may dictate, or it may be left perfectly plain. Being of earthenware, wholly detached from the walls, and not boxed-in, its whole surface, as well as that of the surrounding floor (which may be of cement, tiles, or other non-absorbent material), may be readily cleansed with mop or house-flannel; and in public institutions, where hydrants and hose are available, a well-directed jet of water will at once cleanse the whole of the space around and under the closet-basin. The abolition of the usual wooden casing or boxing-in is a great gain, as preventing the accumulation of dust and dirt and the harbouring of vermin.

The well-known firm of J. Tylor & Sons, of Newgate-street (Stand 928), have some very useful and interesting exhibits, including a good serviceable bath made of zinc-plate, one-eighth of an inch thick. This bath fills very quickly through clear-way valves, and is emptied very rapidly by a 3-in. valve outlet. Messrs. Tylor also exhibit two sample bath-rooms. One, that for a first-class house, is provided with a 5 ft. 6 in. copper bath, with rounded bottom, 2-in. quick waste, wooden cradle, and walnut top and skirting. The lavatory *en suite* has a polished walnut casing with tile panels. The bath-room for a second-class house is provided with a 5 ft. 3 in. galvanised tinned iron portable bath, which requires no casing in, and may be readily removed, as a tenant's fixture. Some good lavatories are shown at this stand, including one with a flushing-rim basin. There are also shown some strong and serviceable barrack or school lavatories, some with treadle-motion supply and wastes and some with quadrant motions. By either motion the basins are very quickly filled and emptied, the waste-outlets being unusually large. These lavatories are admirably adapted for military or police barracks, or for schools. They are provided with Tylor & Sons' patent "waste-not" self-closing, non-concussive tap, which appears to make good its claim to the possession of the three qualities indicated by its name. It is regulated to discharge about two gallons of water, but can be made to run more or less if required. It cannot be made to run a continual stream, but closes of itself should the handle be fastened open. The same exhibitors' trough lavatory range, with slate top and skirting, and with irremovable spindle-plug wastes

is very strong, and well calculated for use in schools. The wastes and overflows immediately disconnect themselves by discharging into an iron trough, so constructed and fixed that without removing any parts the wastes and overflows are accessible for cleaning, should stoppage take place. Tylor & Sons' improved slop-sink is provided with an after-flush, and has other good points in its favour. Their "flush-out" urinal, supplied by automatic syphon cistern, is worth attention from the fact that the part through which the discharge from the basin takes place is at a higher level than the bottom of the basin, which retains just sufficient water to cover the bottom about 1 in. in depth. The outlet also serves as a trap at the head of the discharging-pipe. Door-action urinals and closets, Tylor's automatic flushing-cistern for urinals (which can be set to discharge at stated intervals), and the "model" waste-not syphon cistern, are all well worth the inspection of visitors. The same firm's patent "universal" disconnector trap and connectors, for cutting off soil-pipes from direct connexion with the drain, are also worth notice. The trap is capable of easy inspection, and as the connectors fit into one another, the depth at which the drain is laid is immaterial. Among the water-closets exhibited at this stand are Tylor & Sons' "clear-way" regulator valve-closets, and their valve, hopper, and ships' closets fitted with Terry's patent time-economising pedal action. These are well worth notice, as is Bean's improved iron hopper closet, fitted with the "model" waste-not cistern. A little contrivance known as Tylor's patent grooved joint for connecting lead-pipe without solder is not so generally known as it apparently deserves to be. We are informed that a joint so made will stand 40 lb. pressure. This joint is allowed by the Canterbury and other water companies. Water fittings are, and always have been, a speciality with these exhibitors. Besides a great variety of water-closet and bath valves and fittings, they show their "City of London" water-post or street well, fitted with their "model" waste-not cistern, as fixed for the Corporation of London in the courts and alleys of the city, under constant supply from the mains of the New River Company. The water-post cannot be left running, and only yields one pailful at each turn of the knob, and for it to do this the knob has to be held by the person who comes to draw the water. When one pailful has been obtained no more will flow, no matter for how long a time the knob be held back. When the knob is released, the cistern rapidly fills, and another pailful can be obtained, and so on *ad infinitum*. Another special feature at this stand is Tylor & Sons' patent automatic district water-meter, by the use of which water companies are able to tell in what districts supplied by them water is running to waste. A triplicate nest of 8 in. patent water-meters and sluice-valves are to be seen in full working operation close to the great fountain in the grounds of the Exhibition, registering the quantity of water supplied to the fountain. Scott's patent callipers, for measuring the thickness of large iron water-mains, are gigantic in size, but simple and easy to use.

But unquestionably the most interesting exhibit to be seen at Messrs. Tylor's stand is the "Bell Waterphone" and Tylor's patent "Sound-connector," for detecting waste of water in any house where it is going on, without actually inspecting the fittings of the said house. The *street* in which excessive waste occurs can be found by the aid of the district meter, but a difficulty occurs, in towns where no stop-cocks are fixed outside the houses, in ascertaining the exact premises where waste is occurring. This difficulty appears to be admirably met by the "waterphone." In towns where the value of water or the amount of the water-rating renders some expense permissible, the arrangement for bringing the supply-pipe within the reach of the inspector consists simply of a piece of iron pipe, merely clipped on to the supply-pipe, and carried up to the level of the surface of the pavement, terminating in a cap, the top of which has the appearance of a piece of iron about as large as a penny-piece let into the pavement. This piece of pipe is the "sound-connector," and on the end of the little disc of iron which forms its top the inspector rests the lower end, of the "waterphone," which is merely a solid stick of wood, fitted at the top with a vulcanite bell or trumpet-mouth, somewhat resembling in appearance the "receiver" of a telephone. Applying his ear to this, the upper end, of the waterphone, the inspector (or any one else) can at once distinctly hear when water is flowing through the supply-pipe. The inspector makes his rounds at night, when all cisterns (where they exist) should be full and the occupants of the houses asleep, and when, consequently, there should be no flow of water through the supply-pipe from the main, unless there be defective fittings or gross carelessness. Where such a flow is detected (as it can be, instantaneously and unerringly, by the use of the waterphone), the inspector uses his discretion as to whether he will arouse the inmates of the house or call next day to inspect the fittings. This system is being used by the New River and other companies, who have largely adopted the constant-service system, and it is certainly a most ingenious, though a very simple, application of a known scientific law to a new requirement. It may, indeed, be said to be merely a modification of the stethoscope. All visitors to the Exhibition interested in the problems connected with the water supply of large towns should stop at Messrs. Tylors' stand, where, by the courtesy of the gentleman in charge, they will be enabled to test the use of the waterphone for themselves.

Messrs. Shanks & Co., of Barrhead, near Glasgow (Stand 929), are exhibitors of some of their specialities, including their "Eureka" spray and plunge bath. This bath is made with a circular end, widening out from the other part of the plunge-bath. On this circular end is mounted the canopy, which is circular on plan. By this arrangement the spray jets all converge to the centre, and ample room is provided for the bather. The fittings include a hot and cold water mixing chamber, and the waste-pipe is on Shanks's patent principle. This firm's needle-bath, a skeleton-like construction of copper and brass tubes, with hip-sprays, and douche and shower at the top, is worth notice, as being well adapted for use in hospitals and other public institutions. The "Universal" combined bath and fittings shown by this firm possesses many advantages. It is cheap, and needs no casing. The waste-pipe, in which the overflow and waste plunger works, is cast solid with the body of the bath in one casting. This bath is readily fixed, and the soap-dish, taps, &c., are within easy reach of the bather. The same exhibitor's wardrobe-bath presents a combination of sitz, plunge, and shower bath, all inclosed within a wardrobe-like cabinet, an arrangement which has the merit of not occupying much space, but the plunge-bath is contracted in size. Some good fireclay sinks, enamelled inside, are shown at this stand, also folding and other lavatories.

At the next stand, No. 930, Mr. Josiah Webber, of Greenwich, exhibits the "Olynthion," a bath by means of which it is claimed that the doctor may secure in the patient's home the best therapeutic effects of a hot or cold air bath, facilities being given for medical observation and control.

Stand 932 is occupied by Mr. S. Owen, of Fann-street, who shows a variety of bath and other valves, and the patent "Comfortable" bath, the special point in which is that it is provided at the wide end with a raised seat for the bather. The bath is of cast-iron, enamelled.

Mr. Richard Crittall, of North-street, Manchester-square (Stand 933), is an exhibitor of a completely-fitted bath-room, provided with an improved "Roman" bath, which has the hot and cold valves, waste-pipe, &c., all connected to the bath, requiring no separate fixing.

Messrs. B. Perkins & Son, of Bermondsey-street (Stand 934), exhibit gas-heated baths, and the "Hecla" water-heater. These heaters are fitted with the exhibitors' patent atmospheric burners, and some of them are provided with linen-airers.

Mr. Thomas Waller, of Fish-street-hill, exhibits (Stand 935) an improved open or plunge bath fitted with spray, and combined with a hot-closet for warming linen and towels, the warmth being obtained from the hot water cistern.

Stand 936 is occupied by Messrs. Clements, Jeakes, & Co., of Great Russell-street, who show, besides a variety of gun-metal water-fittings, a bath-stove and boiler, and a hot water circulating cistern. They also show an improved needle-bath, fitted with marble screen and tile floor; together with sinks and wasting troughs.

Messrs. R. Ewart & Son, of Euston-road, exhibit in action, at Stand 937, the "Monerieff" bath, fitted with ten services, and encased in panelled and carved walnut. The "Challenger" bath with boilers, a gas-bath, and specimens of portable baths, are also shown here.

At Stand 938, Mr. John Smeaton, of Ludgate-circus, exhibits a very good spray-bath, combining spray, shower, douche, rose, and wave. This bath is one of the best in the Exhibition, though by no means the most expensive. This exhibitor also shows lavatories with tip-up and pull-out arrangement. The Bachelor's bath and lavatory, combined with wardrobe, is worth notice. Some good water-closets, the Smeaton cast-lead "Eclipse" trap, hospital and other slop sinks, and some excellent specimens of plumbing work, are shown by the same exhibitor.

The West Central Sanitary Engineering Company, of which Mr. W. Smeaton, sen., is the manager, exhibit, at Stand 939, a combination spray and wave bath, also a needle-bath with cistern above. A sitz-bath with a novel arrangement of valves, &c., deserves the special attention of visitors. Lavatories, kitchen sinks, and housemaids' slop-sinks are also shown at this stand.

Messrs. J. Allen & Son, of Marylebone-lane, exhibit (Stand 970) their specialities in the way of portable Turkish hot-air and vapour baths. By means of these simple appliances, readily conveyed from place to place in a small box, a hot-air or vapour, or a medicated or mercurial bath, can be obtained with ease and completeness at home or abroad. Those who have not seen these appliances should take an opportunity of doing so when they visit the Exhibition.

Stand 971 is occupied by the North British Sanitary Engineering Company, who show an improved hip-bath. Messrs. John Hall & Co., of Stourbridge (Stand 972), exhibit their patent enamelled porcelain bath, for which no casing is required, as it is enamelled outside as well as inside. This, and the enamelled sinks and troughs for various purposes shown by the same firm, are very cleanly in use. White and coloured glazed bricks are among the other exhibits of this firm.

Messrs. Doulton & Co., of Lambeth (Stand 408 in the Central Gallery), exhibit some very good baths, water-closets, and other sanitary appliances in and about the four angle-buildings which are grouped about their central pavilion or trophy of Doulton ware and Lambeth faïence. One of these corner buildings is fitted up as a bath-room, and contains a porcelain bath and one of the "Lambeth" instantaneous water-heaters, in which, by a simple arrangement, the act of turning off the water turns off the gas. This heater is to be seen in operation in the gentlemen's lavatory overlooking the gardens, near the clock-tower. The bath is provided with locking apparatus for the prevention of the waste of water, it being impossible with this apparatus to open the hot or cold supply-valves while the bath waste or discharge is open. The "Lambeth" valve-closet, with stoneware trap, inspection-cap, and ventilating socket, is made for fixing entirely above the floor level. This firm are exhibitors of other good water-closets, foremost amongst which we must place their patent "Combination" closet, so called because by turning up the seat the closet is available as a urinal and as a slop-sink. The closet, which is to be seen in action in the gentlemen's lavatory before mentioned, is of the "wash-out" or "flush-out" type, with front outlet, and the form of the basin is such as to retain an adequate depth of water. Externally, the closet-basin and its trap are of decorated stoneware, the closet being intended, like one already referred to, to be used without any wooden casing-in or enclosure, with the same attendant advantages in the direction of cleanliness and accessibility. This closet may be flushed either by a direct self-acting seat arrangement, or by pull-down handle or chain. Altogether it is a most effective and simple closet. A form of closet somewhat resembling this was suggested in our columns by Mr. E. J. Tarver in September last. In the lavatory already referred to are also to be seen Messrs. Doulton's stoneware trough urinals, which always retain a good supply of water, and are cleanly and effective. The troughs are thoroughly flushed out at intervals by means of Doulton's patent automatic flush-tanks and syphons, which are also shown in action in one of the corner buildings opposite the domed pavilion which constitutes the chief exhibit of this firm. These excellent flush-tanks possess several recommendations, in-

cluding simplicity of fixing, freedom from moving parts, facility of inspection, and instantaneous action even with drop by drop supply. Slop sinks, butlers' sinks, and kitchen sinks in enamelled earthenware; the "Lambeth" trough urinals and closets, with good method of flushing; lavatories and lavatory basins; and stoneware for sanitary purposes, are among the other exhibits shown by this firm. One of the specialities in this line, to which we may refer a little in detail, is the patent enamel-glazed (inside and out) stoneware pipes, for drains which have to pass under houses. These pipes are made longer than the usual drainpipes, in order to reduce the number of joints, which are, if we understand aright, a new form of Stanford's patent joint, with a give-and-take or ball and socket motion to allow of some degree of settlement in the ground without breaking the pipes or causing leaky joints. We have yet to be convinced, however, that any precautions of this kind are to be compared, on the score of reliability, with properly-jointed pipes (Stanford's joint, for instance) laid on a foundation or bed of concrete. Plumbers' brass-work, water-waste preventers, grease-intercepting traps, and cognate appliances too numerous to specify, go to make up what is, regarded merely in its practical aspect, a very interesting and important series of exhibits.

But we must break off here, reserving for a future article the notice of a number of kindred exhibits.

SCHOOL FITTINGS AND ACCESSORIES.

SINCE our former notice,* considerable additions have been made to this section of the Exhibition, and in Classes XLVII. to LVII. in the Albert Hall a fair collection of educational appliances is brought together, although many exhibitors whose names are down in the catalogue are not yet to be found, and a comparison with the advanced Belgium system can now be more easily made, in which it will be seen that in technical education and object teaching we are not to the front. There are, however, points in our method which might with advantage be copied by our neighbours, whose way, we have shown, is very systematic, whereas a great deal of individuality marks the procedure of our own country, which allows a greater scope in special cases, and tends to prevent a dull uniformity or monotonous level from circumscribing the attempts of the ambitious few who object to be trammelled by precedent.

The "Kindergarten" system is beginning to be recognised as the right principle, and is making fair headway in spite of many conservative obstructionists, and an amusing and instructive process of "educational printing" for children is shown by Mr. M. Farmer, Albert Works, 34 and 36, Britten-street, Chelsea (1,372), which process is the same as that adopted in many offices of transfer copying by means of a gelatinous sheet and prepared ink on ordinary paper, on which the various subjects and objects are ready drawn, and can be printed off by merely damping and pressing to the number of fifty to eighty copies. Each letter of the alphabet is thus represented, and some of the figures have a tendency to the facetious, which would serve as an additional inducement to children, or even their elders, to take considerable interest in the reproduction.

The Midland Educational Company (1,380), of Birmingham and Leicester, show several useful diagrams relating to physical geography, astrology, and manufactures, and charts showing the depths of the ocean, action of tides, and other marine phenomena, and have also some examples of the ordinary school-desks and fittings, but with no special points of importance.

The Educational Supply Association, Limited, 42A, Holborn-viaduct (1,383), have some good school furniture of the regulation type, a speciality of theirs being illustrations of trades in which the various artificers are grouped together at their respective occupations in singularly inartistic drawing. It is the ordinary lithographed trade article, and contrasts unfavourably with many good drawings of a somewhat like character to be seen elsewhere, and as we understand that the sale has been large, it is to be hoped that for the future a little more life and character will be imparted to the drawing, as children are becoming accustomed to good work, even in the nursery.

The North of England School Furnishing Company, Limited (1,384), of Darlington and Newcastle-on-Tyne, send one of the best collections, both as regards size and quality; and attention may be called to Glendenning's patent adjustable desk, which may not be known to many of our readers. It has horizontal and vertical adjustment for both seat and desk, and a movable pad to fit the hollow of the back to prevent stooping, and force the back into an upright and healthy position, which on trial will be found very comfortable. The same remarks apply to a music-chair by the same inventor, and some well-drawn cartoons on the wall show the difference of the positions obtained. The "Darlington Secrétaire" shown by this company, is a piece of furniture designed by an architect, but more suitable, perhaps, for the library than school-room or office; although it has many points which would make it serviceable in any of these places. Another novelty is a raised map of the United Kingdom in a tray or dish into which water is poured, so that the sea is represented by the water, and gives a good idea of the proportion of our surroundings, and the position of the various islands and channels, and as children are specially fond of water as a plaything this seems a good method of leading their tastes to a useful end.

The next five exhibitors, Messrs. George Hammer & Co., Messrs. H. & G. Edwards, Messrs. Wake & Dean, Mr. John Heywood, and Mr. G. E. Hawes (1,385 to 1,389) all send sound and serviceable desks and furniture, such as we have seen before, but they have nothing new to describe; and adjoining these spaces is a stand belonging to J. Curwen & Sons, 8, Warwick-lane, E.C. (1,391), who show the musical notations in use in the elementary schools of Great Britain, and by the diagram we see that the staff notation is used to the extent of nearly one fourth against the remainder, where the tonic-sol-fa system still unfortunately holds its own. As we are upon the subject of music we will for the moment omit the next few exhibits, and turn to No. 1,418, the Musical Reform Printing and Publishing Company, 74, Fann-street, E.C., who apparently advocate a simplified staff notation, and introduce the keyboard stave, which, according to their theory, sweeps away all the difficulties and anomalies of the old system; but as this cannot be adopted without re-writing all the music in the world, what is the practical value of it?

Messrs. Garcet & Nisius, 76, Rue de Rennes, Paris (1,392), send some children's desks and seats on the English system, small and few, but fairly good; and adjoining them are some regulation desks and fittings by Messrs. Hodkinson & Clarke, Canada Works, Small Heath, Birmingham (1,393), who also have erected a partition for the division of school-rooms on the revolving-shutter principle. The next subject which takes our attention is (1,424) the shorthand system shown by Émile Duployé, 23, Quai d'Horloge, Paris, who would revolutionise shorthand by the adoption of his method, of which a specimen is given in ordinary reporting style, in which some of the words are written alphabetically in full and taught in twelve hours; the translation being, "This system thoroughly removes all difficulties in acquiring the art of shorthand; it is so simple that a child can learn it, being taught at school to children before they can read and write. The insertion of vowels renders a transcript easy to make at any distance of time, and it is briefer than any other method in the world." This seems a royal road to learning, but we presume in this, as in other cases, authorities will differ. There are numerous exhibits which follow, containing educational works, maps, diagrams, and incidentals of general and every-day use, and by which many well-known firms are represented, but, of course, are too well known to require capitulation; and in Class LI., which includes material for science teaching, instruments and apparatus predominate, which may be of interest to specialists, but not to the general reader, whose views may, perhaps, be appealed to by some Dutch models of food parasites shown by Paul Osterloh, Fabrikant von Botanischen und Zoologischen Modellen, Amsterdam (1,468), who sends examples of the fungi of grape and potato disease, and different forms of wheat blight; it is to be hoped the danger from these is not so terrible as the specimens, or that the danger is correspondingly magnified, for these are shown in strong colours and materials, and some about the size of a man's head.

Messrs. Moore Bros., 36, Newsham-drive, Liverpool, send some disarticulated members of human and other bodies, sectionised limbs, and nervous systems of the mussel, cockroach, leech, and such small deer, and we realise that they are indeed "wonderfully and fearfully made."

No. 1,481 is a more cheerful subject, and Messrs. Brucciani & Co., 40, Russell-street, W.C., come with some very fine modelling of fruits, flowers, and figures, and plaster casts as supplied to the various schools of art. Their work is, of course, well known and the standard well maintained here, the acanthus leaf and other foliage being specially good and careful.

The special work of Mr. Wm. Gunston, 30, Tollington-place, N. (1,486) is worth looking at, being historical designs drawn on various materials, suitable for wall surfaces, such as "Sgraffito," which is but yet little used, and consists of one or more layers of thin plaster or cement-composition of different coloured layers laid over each other, and when still wet these are cut through to a depth to expose the desired colour, and either left in line or a large surface can be shown. Another is a painting on canvass of the death of Prince Arthur, and although a monochrome, is fairly effective and suited to its purpose of teaching as may be also [illegible] of Scripture subjects on tiles and other[illegible]te.

Mr. Stanford, of Charing-cross, includes some of his well-known geographical and geological maps and cognate items, and a stereographical map is so shaded that it quite looks as if the surface is worked in relief, and conveys a good impression of the ranges of mountains and salient features.

Messrs. Terry & Co., Little Denmark-street, Soho, have some good Scripture cartoons and educational pictures, &c., which are block-printed and capable of being washed, and have the additional attraction of being very well drawn, as are also some French specimens, though in a different style, of anatomy and botany of every-day subjects with which the youthful mind comes in contact, although the idea that the French eat largely of snails and frogs will not be dispelled by seeing the carefully-executed diagrams showing the gradual formation or construction of these dainties. In the Central Institution of the City and Guilds of London (the handsome new building in the Exhibition-road) is a collection of works classed in this group, and which are treated separately in another column.

On Tuesday last H.R.H. the Prince of Wales, President of the Exhibition, formally inaugurated the work of the international juries. Subsequently Sir James Paget delivered an interesting address on the relation between national health and work.

HEALTH EXHIBITION.

Group III. Class XXII. South Annexe.
BATTEN'S PATENT
SEWER VENTILATORS
AND MAN-HOLE COVERS.
No. 150, LOZELLS-ROAD, BIRMINGHAM.
[See May 31, p. xxii.

BECK & CO. (LIMITED),
130, GREAT SUFFOLK-STREET, SOUTHWARK, S.E.
STAND 541. EASTERN ANNEXE.
VALVES, HYDRANTS, METERS, STREET BOXES, ROAD WATERING POSTS, PUMPS for Hand and Power.
Patent Water-Waste Preventing Cisterns and Water-Closets.
Fire Extinguishing Appliances, &c.

Group III. Class XXV. No. 715, Central Annexe.
VENTILATORS for ROOFS of HALLS,
CHURCHES, SCHOOLS, HOUSES, DRAINS, SEWERS, &c.
W. P. BUCHAN, S.E. { 21, Renfrew-street, Glasgow.

THE COALBROOKDALE CO., Lim.
SHROPSHIRE and LONDON (Holborn Viaduct).
Stand 577, Class xxiv., &c., East Quadrant.

No. 714, CENTRAL ANNEXE.
MEAKIN & CO. Baker-street, W.
SASH PULLEYS, SASH FASTENERS, AND
NEW PATENT SASH FOR CLEANING.

LIGHTNING CONDUCTORS.
SANDERSON & CO. (Richard Anderson, Proprietor).
Contractors to the War Department.
Sole Inventors of the Solid Copper Tape Lightning Conductors.
LEADENHALL HOUSE, 101, LEADENHALL-STREET, E.C.

STAND No. 382. South Central Gallery.
STONES' Sound-proof SWIVEL PARTITIONS. Stones Revolving Shutter and Divisions. Stand No. 1,143. Western Gallery. Steam Hoist showing the working of Stones' Automatic Safety Shutters for closing openings.—JOHN STONES, Ure Mills, Ulverston.

EAST GALLERY, STAND 360.
WM. WOOLLAMS & CO.
Original Manufacturers,
ARTISTIC WALL AND CEILING PAPERS
free from Arsenic.
No. 110, HIGH-STREET, near MANCHESTER-SQUARE, W.

GLAZED BRICKS.
Stand 842, East Central Gallery.
The WORTLEY FIRECLAY CO. Ellaud-road, Leeds.
Only award to English makers
At International Medical and Sanitary Exhibition, 1881.

* See p. 812, *ante*.